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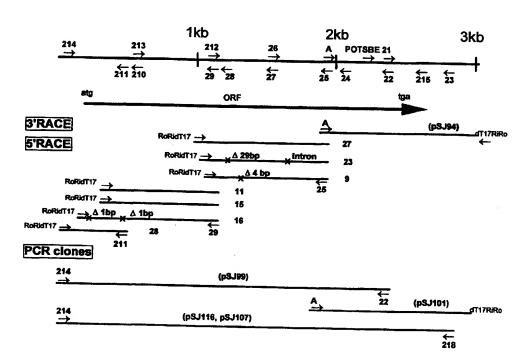
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(54) Title: IMPROVEMENTS IN OR RELATING TO STARCH CONTENT OF PLANTS



(57) Abstract

Disclosed is a nucleic acid sequence encoding a polypeptide having starch branching enzyme (SBE) activity, the encoded polypeptide comprising an effective portion of the amino acid sequence shown in Figure 4 or Figure 13.

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ional Application No PCT/GB 97/03032 A. CLASSIFICATION OF SUBJECT MATTER IPC 6 C12N15/82 C12N C12N9/10 C12Q1/68 C12N1/21 C12N15/54 A01H5/00 According to International Patent Classification (IPC) or to both national classification and IPC B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 6 C12N C12Q A01H Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practical, search terms used) C. DOCUMENTS CONSIDERED TO BE RELEVANT Citation of document, with indication, where appropriate, of the relevant passages Category 3 Relevant to claim No. SALEHUZZAMAN, S.N.I.M., ET AL . : X "CLONING, PARTIAL SEQUENCING AND 1-3.EXPRESSIÓN OF A cDNA CODING FOR BRANCHING 11 - 13ENZYME IN CASSAVA" PLANT MOLECULAR BIOLOGY, vol. 20, 1992, pages 809-819, XP002056647 PAGE 810, LEFŤ; PAGE 814, RIGHT COLUMN, LINE 11-20; PAGE 817, RIGHT COLUMN, PAGE 818, LAST PARAGRAPH Further documents are listed in the continuation of box C. X Patent family members are listed in annex. Special categories of cited documents: "T" later document published after the international filling date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the "A" document defining the general state of the art which is not considered to be of particular relevance "E" ea"ier document but published on or after the international "X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) involve an inventive step when the document is taken alone document of particular relevance; the claimed invention "O" document referring to an oral disclosure, use, exhibition or other means

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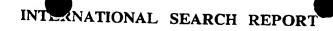
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INTERNATIONAL SEARCH REPORT

Inte ional Application No PCT/GB 97/03032

		1/GB 9//03032
	ation) DOCUMENTS CONSIDERED TO BE RELEVANT	
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	BURTON R A ET AL: "STARCH BRANCHING ENZYMES BELONGING TO DISTINCT ENZYME FAMILIES ARE DIFFERENTIALLY EXPRESSED DURING PEA EMBRYO DEVELOPMENT" PLANT JOURNAL, vol. 7, no. 1, January 1995, pages 3-15, XP002014042 cited in the application see the whole document	1-3, 11-13
X	FISHER, D.K., ET AL.: "TWO CLOSELY RELATED CDNAS ENCODING STARCH BRANCHING ENZYME FROM ARABIDOPSIS THALIANA" PLANT MOLECULAR BIOLOGY, vol. 30, 1996, pages 97-108, XP002056648 see figure 3	1-4, 11-13
X	BURTON, R.A., ET AL . : "STARCH BRANCHING ENZYMES BELONGING TO DISTINCT ENZYME FAMILIES ARE DIFFERENTIALLY EXPRESSED DURING PEA EMBRYO DEVELOPMENT" EMBL SEQUENCE DATA LIBRARY, 6 July 1994, HEIDELBERG, GERMANY, XP002056649 ACCESSION No. G10545	1-3, 11-13
4	WO 92 11375 A (AMYLOGENE HB) 9 July 1992 PAGE 7,8,12; PAGE 24; PAGE 25, LINE 6-19	1-31
A	WO 94 11520 A (ZENECA LTD ;KEELING PETER LEWIS (GB)) 26 May 1994 PAGE 2, LINE 31-36; PAGE 4, LINE 29-36; PAGE 5	1-31
A	WO 95 26407 A (NAT STARCH CHEM INVEST; COOKE DAVID (GB); GIDLEY MICHAEL JOHN (GB)) 5 October 1995 POTATO SBE GENE, USED IN ANTISENSE APPROACH see the whole document	1-31
Ρ,Χ	WO 96 34968 A (NAT STARCH CHEM INVEST; COOKE DAVID (GB); DEBET MARTINE (GB); GIDL) 7 November 1996 PAGE 4,5; PAGE 8,14,21; CLAIM 66	1-3, 11-13,15
Ρ,Χ	WO 97 22703 A (DU PONT ;HUBBARD NATALIE LOUISE (US); KLEIN THEODORE MITCHELL (US)) 26 June 1997 see the whole document	12,13



Int tional Application No PCT/GB 97/03032

C.(Continu	ation) DOCUMENTS CONSIDERED TO BE RELEVANT	PCT/GB 9	7/03032
Category *	Citation of document, with indication, where appropriate, of the relevant passages		
	assages		Relevant to claim No.
Ρ,Χ	WO 97 20040 A (AMYLOGENE HB ;EK BO (SE); KHOSNOODI JAMSHID (SE); LARSSON CLAS TOM) 5 June 1997 see the whole document		1-4, 11-13
P, X	GAO,M., ETAL.: "INDEPENDENT GENETIC CONTROL OF MAIZE STARCH-BRANCHING ENZYMES IIA AND IIb" PLANT PHYSIOLOGY, vol. 114, no. 1, 1997, pages 69-78, XP002056650 see the whole document		12,13

INTERNATIONAL SEARCH REPORT

information on patent family members

inte .onal Application No PCT/GB 97/03032

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9211375 A	09-07-92	SE 467160 B	01-06-92
		AU 9109791 A	22-07-92
		EP 0563201 A	06-10-93
		PL 169859 B	30-09-96
		SE 9004095 A	01-06-92
WO 9411520 A	26-05-94	AU 5428594 A	08-06-94
WO 9526407 A	05-10-95	AU 688006 B	05-03-98
		AU 1902895 A	17-10-95
		CA 2186399 A	05-10-95
		EP 0754235 A	22-01-97
WO 9634968 A	07-11-96	AU 5509996 A	21-11-96
		EP 0826061 A	04-03-98
WO 9722703 A	26-06-97	AU 1684697 A	14-07-97
WO 9720040 A	05 - 06-97	AU 7716596 A	19-06-97
		SE 9504272 A	30-05-97
		SE 9601506 A	30-05-97